Confined Disposal Facilities (CDFs) within Portland Harbor

Presentation to Community Advisory Group

October 10, 2012

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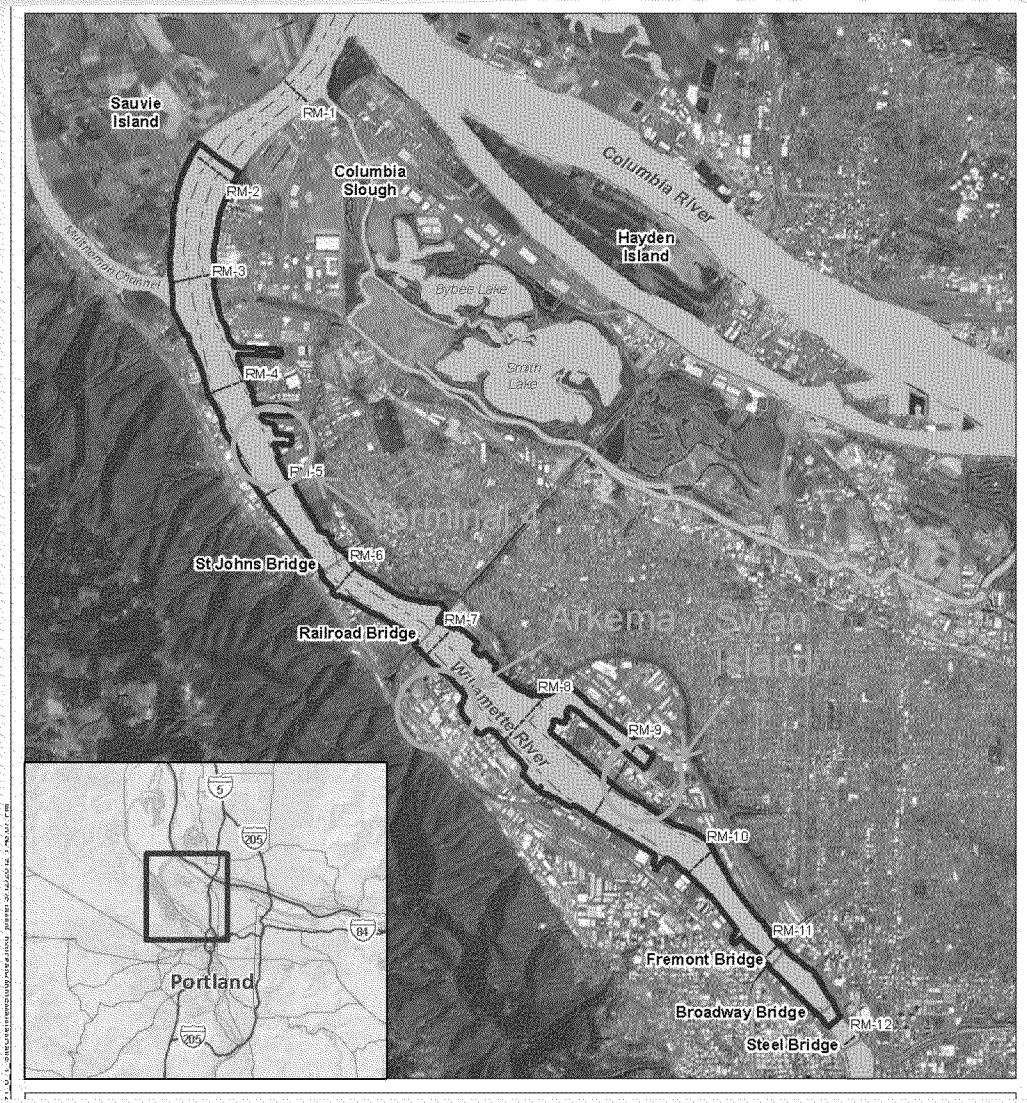
Possible CDF Locations



Source: LWG

CDF Overview

- CDFs used to manage sediments from navigation and environmental dredging projects nationwide
- CDFs are one option being considered at Portland Harbor to manage contaminated sediments
- CDFs may be a cost effective and protective approach for management of some contaminated sediments at Portland Harbor
- CDF design will consider the need for environmental controls
- Site data will be used to determine suitability of material for placement within any Portland Harbor CDF
- Performance standards for long-term environmental protection must be established
- Monitoring will be performed to ensure protectiveness

CDFs – Some Pros and Cons

- Negative Effects
  - Loss of bottom habitat
  - Potential for releases during filling if not properly conducted
  - Potential for long-term release of contaminants

- Positive Effects
  - Cost effective long-term sediment management
  - Facilitation of dredging projects
  - Potential for the creation of new land for redevelopment and recreation
  - Potential for the creation of shallow water, wetland, and riparian habitat through mitigation

Arkema CDF

- Arkema CDF included as a removal action alternative in Draft Engineering Evaluation and Cost Analysis (EE/CA)
  - Arkema CDF evaluation allowed after 2008 dispute decision and is retained as Alternative 5 in the EE/CA document. A Removal Action Area (RAA) consisting of the area exceeding 5 parts per million DDT (and its breakdown products) was identified for EE/CA evaluation
  - The EE/CA will be used as the basis for selecting a cleanup action within the Removal Action Area boundary at the Arkema site
  - The EE/CA was submitted to EPA on July 26, 2012 and is currently under review by the government team in conjunction with the Gasco EE/CA and Portland Harbor Feasibility Study (FS)
  - Conceptual alternatives evaluated in the EE/CA include removal with capping, removal with backfilling, and removal with backfilling and a nearshore CDF; monitored natural recovery (MNR) and/or enhanced natural recovery (ENR) is proposed for areas with lower level contamination

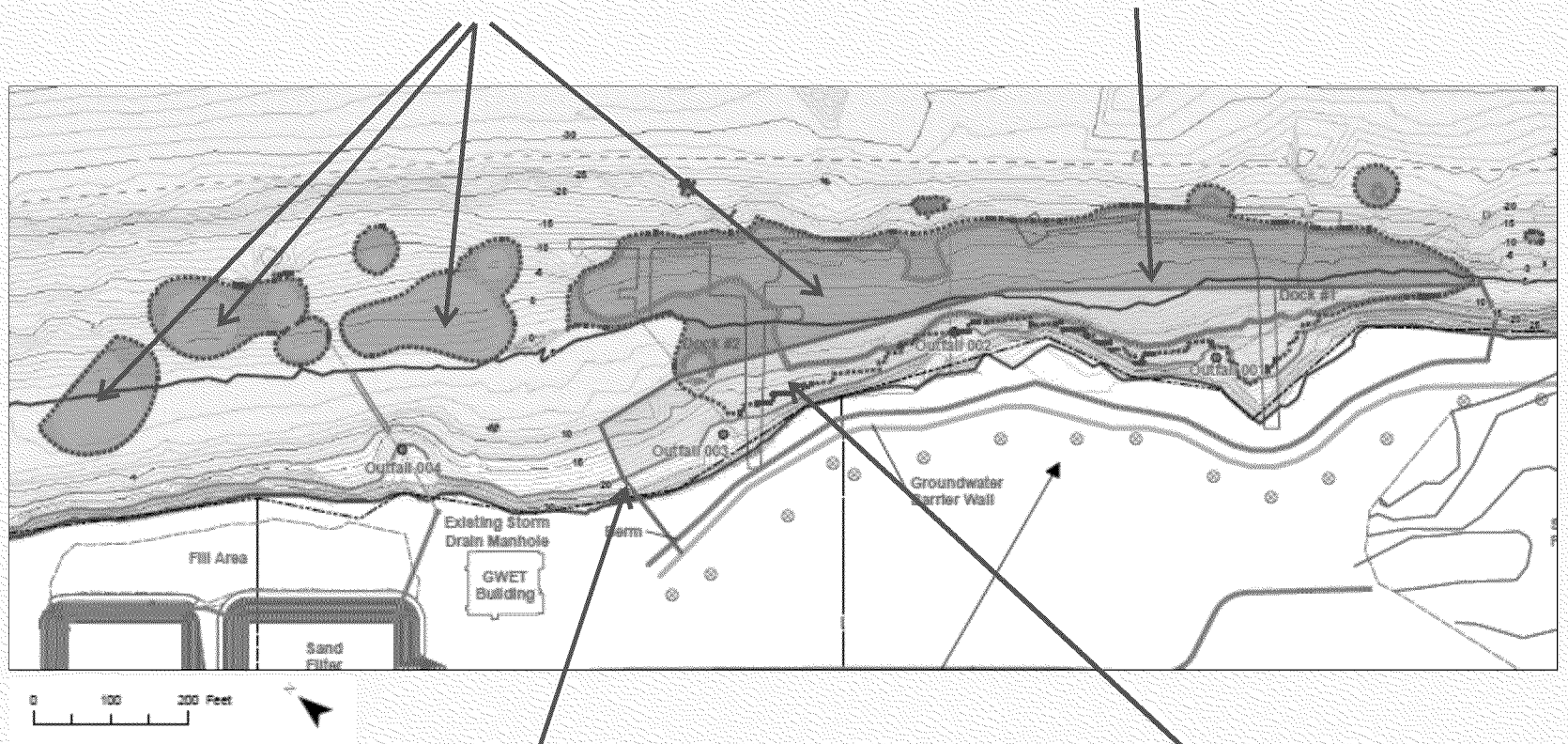
Arkema CDF

- EE/CA Alternative 5 calls for constructing a CDF around a portion of the contaminated sediment
  - The CDF concept consists of a sheetpile wall keyed into the upland groundwater source control barrier wall
  - Areas outside of the CDF exceeding DDT (and breakdown products) action levels will be dredged to a maximum depth of 15 feet and backfilled to grade
  - An estimated volume of 57,000 cubic yards of dredged material would be placed in the CDF
  - Only material from the Arkema site would be placed in the CDF
  - Sediment contamination within the Removal Action Area below DDT (and breakdown products) action levels would be addressed through MNR/ENR
  - The CDF will include a cover suitable for industrial use and construction of a new vessel berthing area

Arkema CDF

Dredge with onsite CDF Disposal

Potential future berthing area



CDF Sheetpile Cut Off

Nearshore CDF with industrial use cover

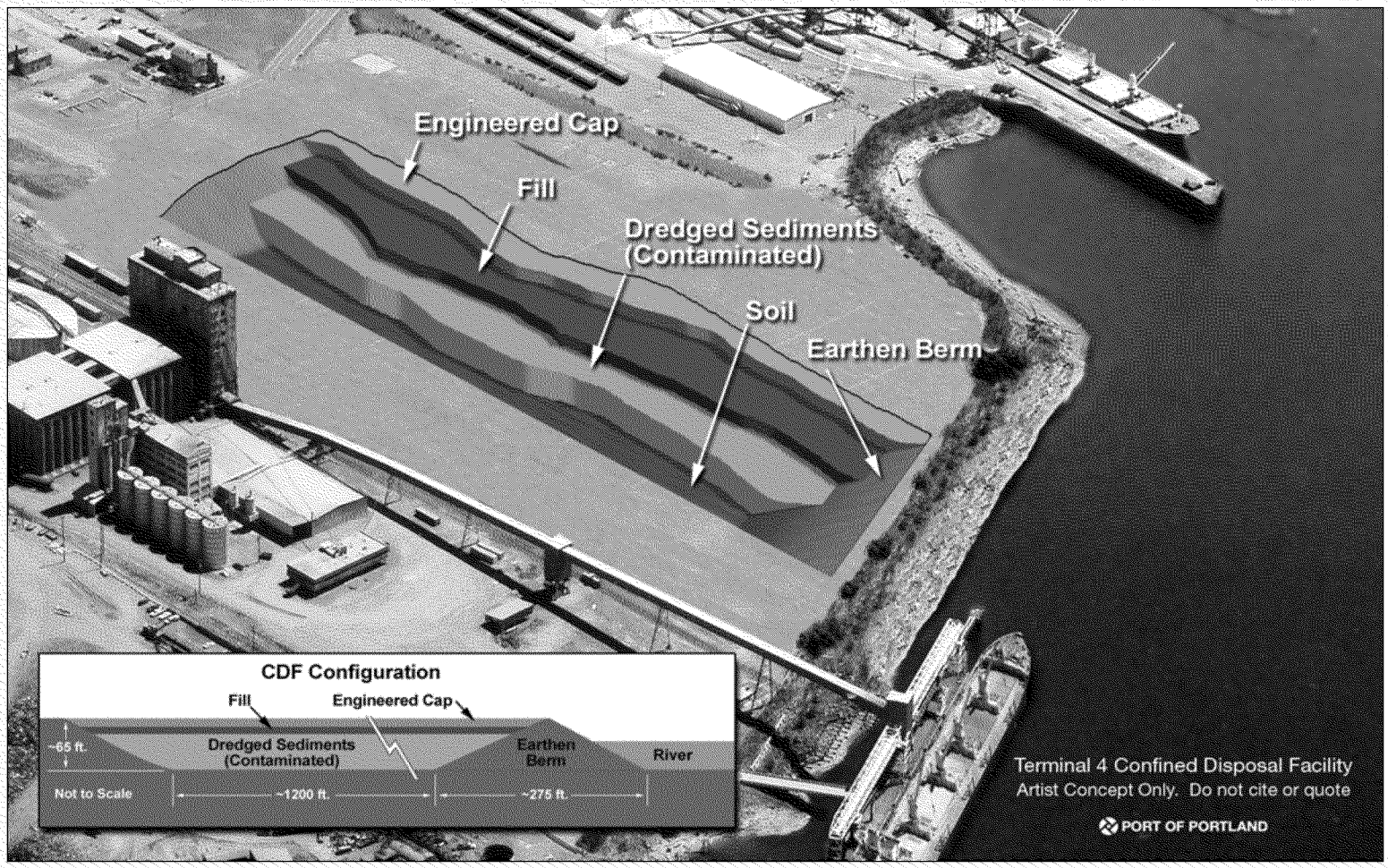
Arkema CDF

- EPA's Expectations for Arkema CDF Evaluation
  - Floodway Impacts Analysis – evaluate if CDF will cause unacceptable flood rise and flood storage impacts
  - Short-Term Contaminant Transport – evaluate use of rigid containment for dredging outside of CDF to minimize releases
  - Habitat Impacts and Mitigation – evaluate mitigation needed due to potential habitat loss (fisheries and wildlife impacts)
  - Geotechnical considerations – need to demonstrate barrier wall is sufficiently "keyed" into the underlying bedrock
  - Hydraulic Containment – evaluate the potential for contaminants to migrate out of the CDF via groundwater
  - Evaluate and comply with harbor-wide performance standards (standards to be discussed in later slides)
  - Treatment Technologies – need to identify a list of both in-situ and ex-situ technologies that can enhance the performance of the CDF such as solidification and thermal desorption

Terminal 4 CDF

- 2003: EPA and Port of Portland entered into Administrative Order on Consent (AOC) for performance of non-time critical removal action at Terminal 4
- 2005: The Port of Portland submitted an EE/CA to EPA
- 2006: EPA Action Memo selected a remedy that includes monitored natural recovery (MNR), capping, dredging and placement of contaminated sediment in a CDF to be built in Slip 1
- 2006: 30% Remedial Design submitted
- 2007: Revised schedule and abatement measures approved by EPA
- 2011: 60% Remedial Design submitted

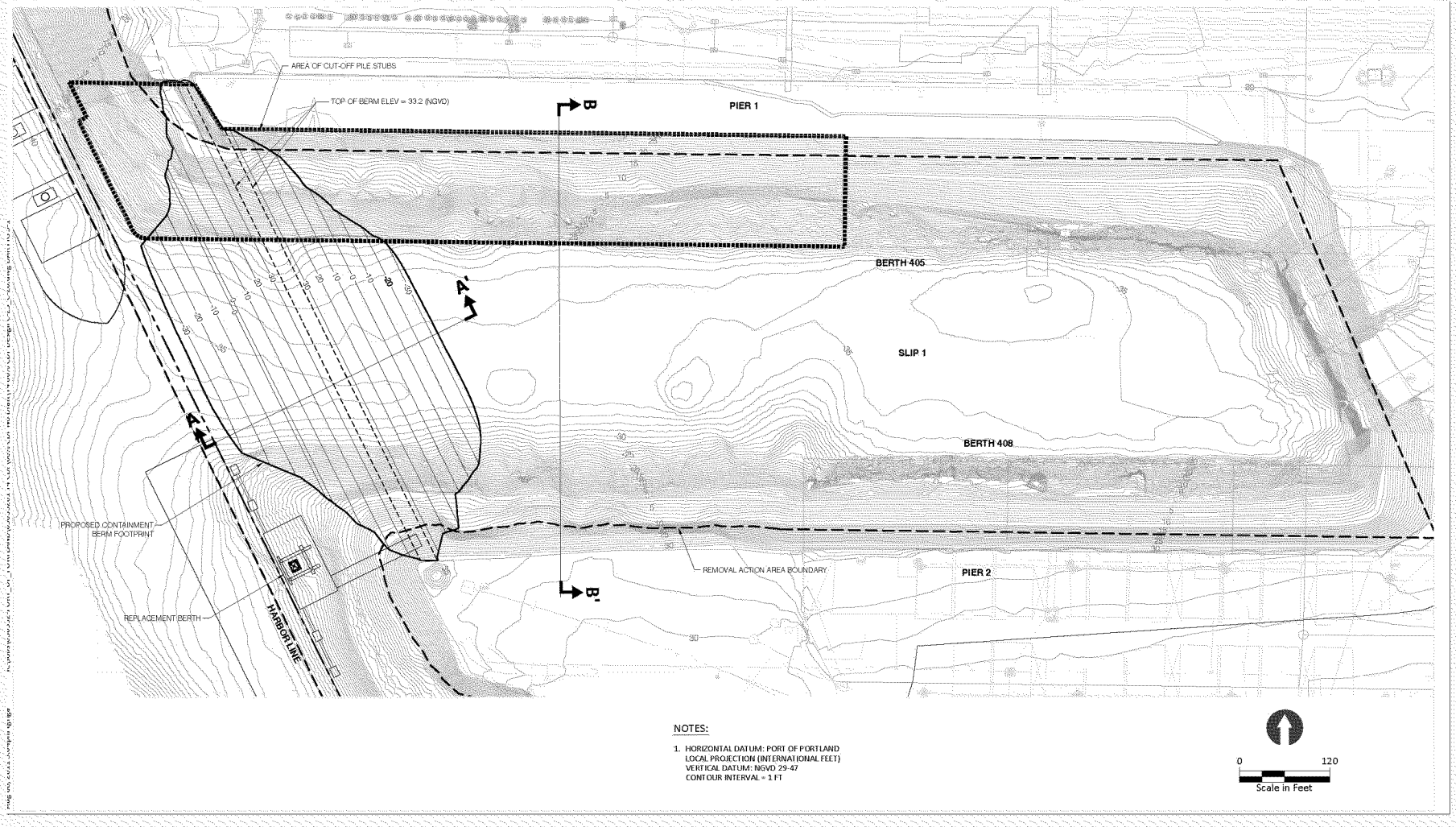
T4 CDF Conceptual Layout



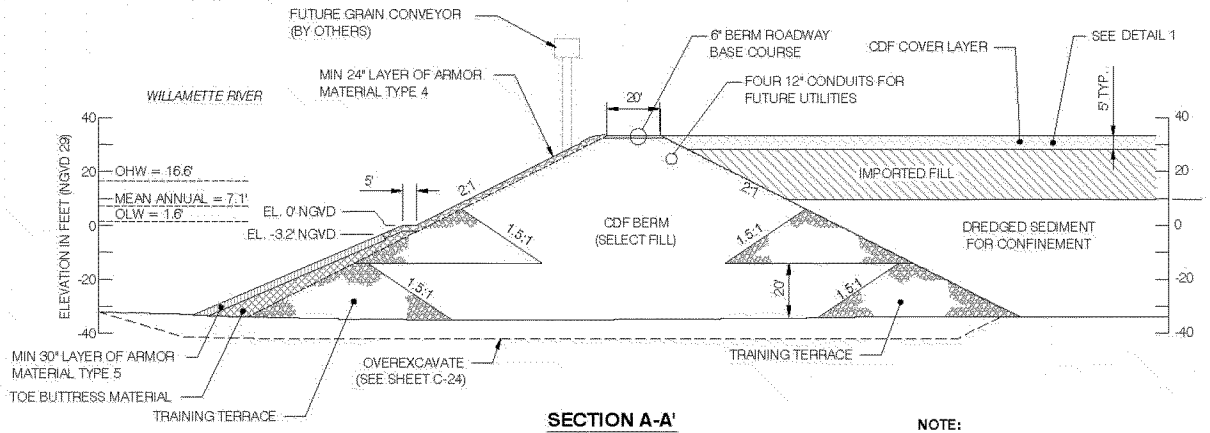
T4 CDF Design Elements and Schedule

- CDF Design Elements
  - Construct a permeable containment berm at the head of Slip 1
  - Place contaminated sediments from Portland Harbor site in Slip 1
  - Construct a CDF cover
- Schedule
  - Portland Harbor FS evaluates disposal of contaminated sediments in the T4 CDF
  - Portland Harbor ROD will specify material to be disposed in CDF
  - Construction will begin following ROD
  - Construction timeframe of 7 to 10 years depending on Portland Harbor cleanup schedule

T4 CDF Design Plan



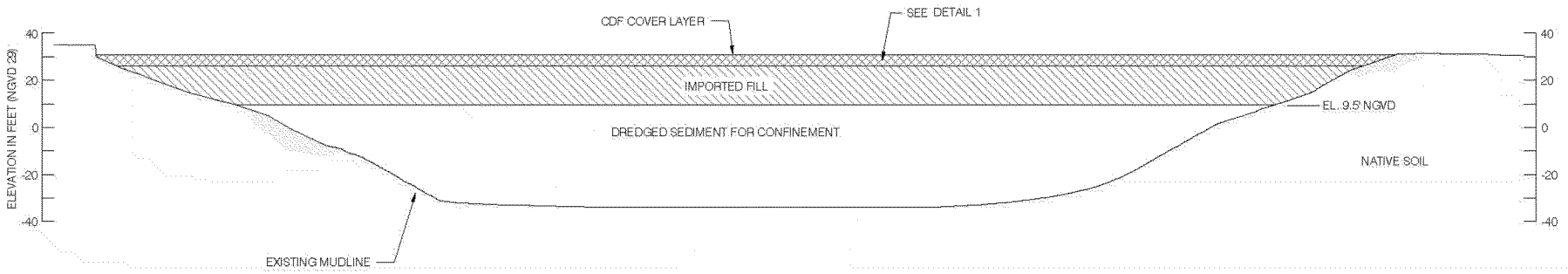
T4 CDF Design Plan



SECTION A-A'

NOTE:

CONTRACTOR CAN USE TRAINING TERRACES TO BUILD THE BERM. THE TERRACES SHALL EACH BE 20' IN HEIGHT. SEE SPECIFICATIONS FOR MORE DETAILS.

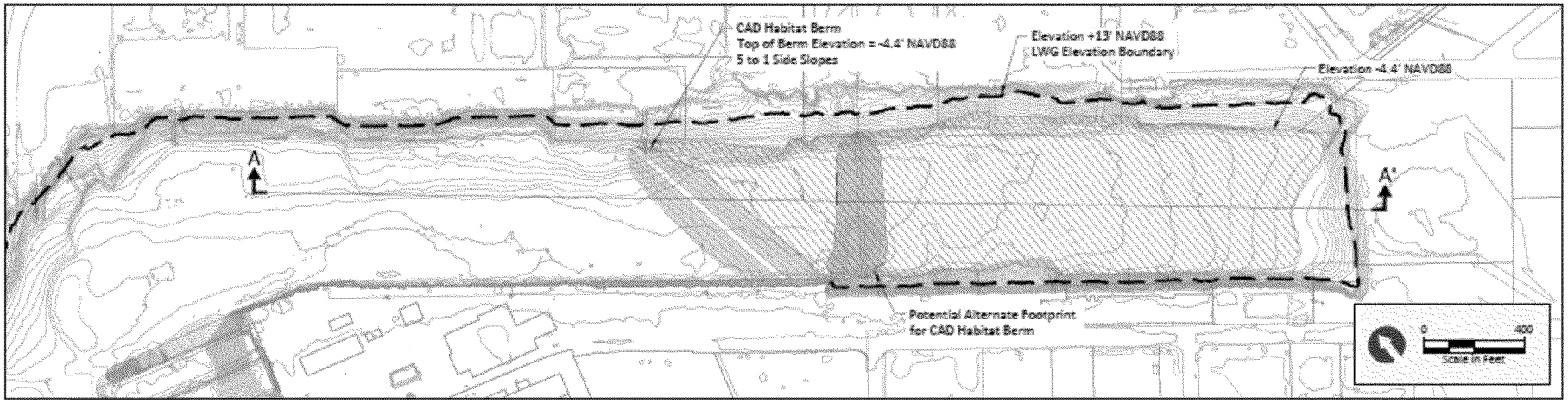


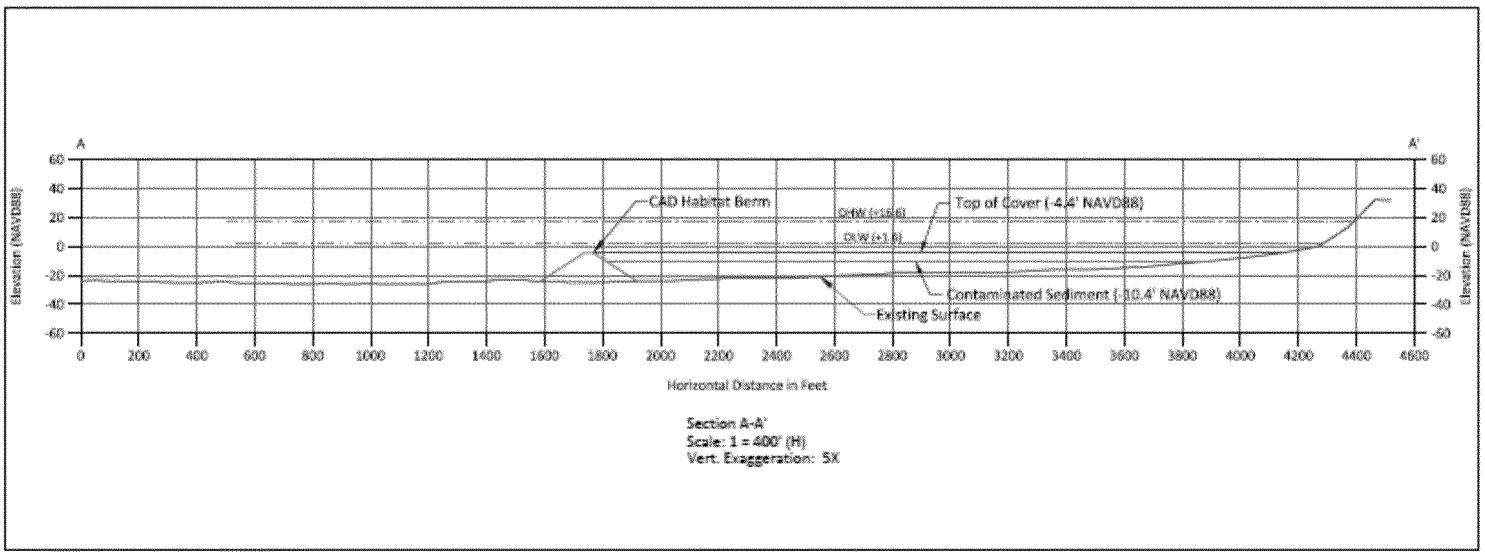
SECTION B-B'

Swan Island Lagoon CDF

- Portland Harbor FS Identified Swan Island Lagoon as potential sediment disposal site (CDF and Confined Aquatic Disposal [CAD])
- Swan Island Lagoon CAD Option
  - Below water (creation of shallow water habitat)
  - CAD cell constructed by building a submerged berm
  - Most promising CAD option identified in Portland Harbor FS
- Swan Island Lagoon CDF Option
  - Above water (creation of developable land)
  - Swan Island Lagoon CDF design similar to T4 CDF
    - Contained on three sides by existing shoreline
    - Isolated from the Willamette River by containment berm
    - Swan Island CDF must comply with T4 performance standards
- Both options require cooperation of nearby landowners
- The ROD is the administrative document in which EPA will identify if the Swan Island Lagoon CDF or CAD has been selected

Swan Island Lagoon CAD





Section A-A'
Scale: 1 = 400' (H)
Vert. Exaggeration: 5X

LEGEND:

- Cross Section Location
- Area of Disposal
- CAD - Confined Aquatic Disposal

HORIZONTAL DATUM: Oregon State Plane North, NAD83 (International Feet).
VERTICAL DATUM: North American Vertical Datum of 1988 (NAVD88).

NOTES:

1. Bathymetry from the LWG database. Some assumptions made on the upland topography above the LWG project elevation of +13' NAVD88. These data will need to be confirmed during subsequent design.

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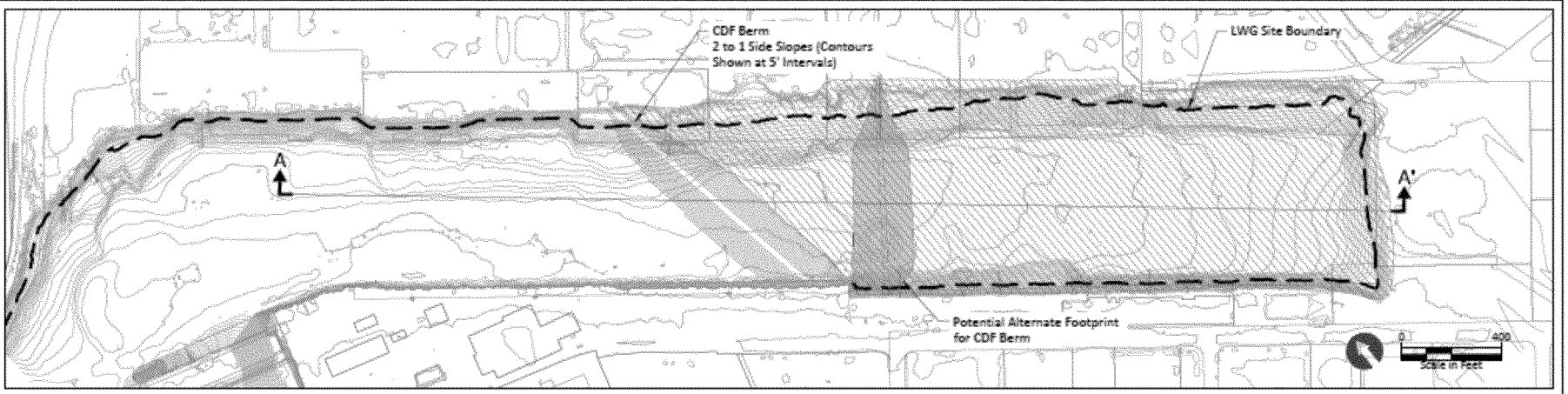
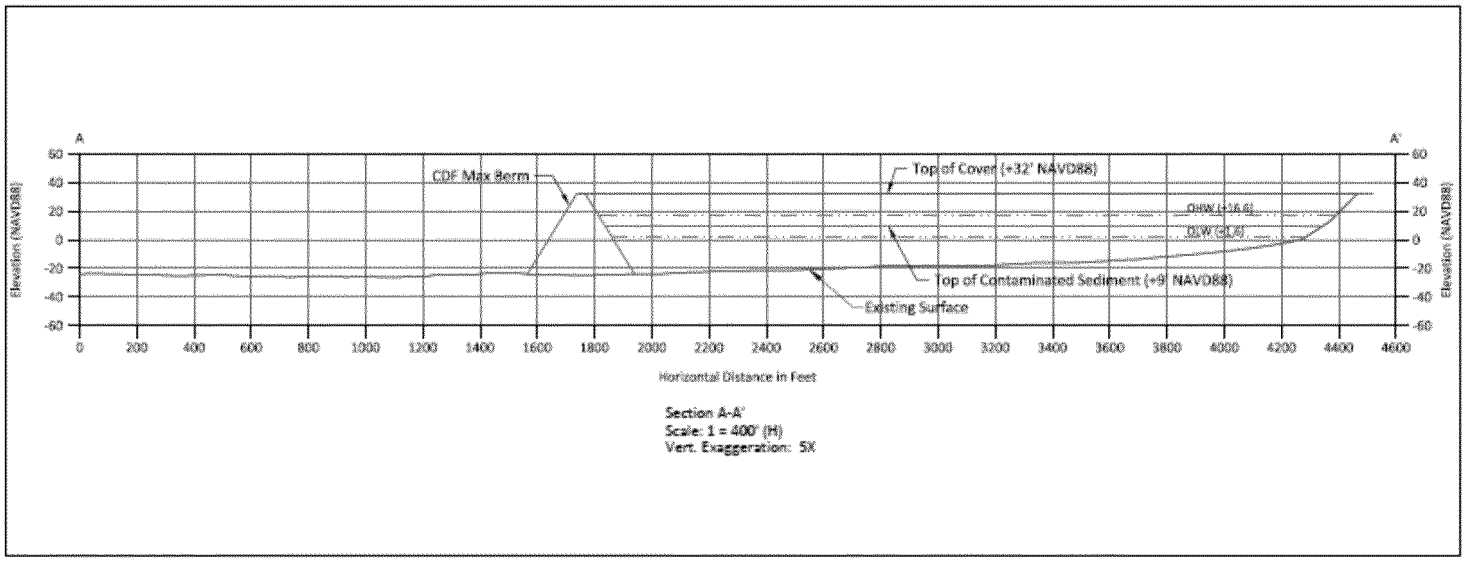
LWG LOWER WILLAMETTE GROUP

Figure 7
Portland Harbor RI/FS
Draft Feasibility Study
Swan Island Lagoon CAD

Swan Island Lagoon CDF





Section A-A'
Scale: 1 = 400' (H)
Vert. Exaggeration: 5X

LEGEND:

- Cross Section Location
- Area of Disposal
- CDF - Confined Disposal Facility

HORIZONTAL DATUM: Oregon State Plane North, NAD83 (International Feet).
VERTICAL DATUM: North American Vertical Datum of 1988 (NAVD88).

NOTES:

1. Bathymetry from the LWG database. Some assumptions made on the upland topography above the LWG project elevation of +13' NAVD88. These data will need to be confirmed during subsequent design.

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Figure 8
Portland Harbor RI/FS
Draft Feasiblity Study
Swan Island Lagoon CDF

Portland Harbor Contaminants

- Primary contaminants of concern in Portland Harbor consist of PCBs, dioxin/furans, pesticide DDT, and polycyclic aromatic hydrocarbons (PAHs)
- Volatile chemicals and nuisance odors can be present at dredging and CDF filling operations
- The primary contaminants in Portland Harbor are generally non-volatile
- Sediments from dredge sites containing high concentrations of volatile chemicals are likely not suitable for placement in CDFs without undergoing treatment to meet CDF acceptance criteria
- Monitoring for volatilization and nuisance odors during CDF filling may occur if needed
- Best management practices (BMPs) such as controlling the rate and manner of filling can be implemented to limit volatilization and nuisance odors

Disposal Site Selection Process

- Portland Harbor FS is evaluating a range of disposal options
  - CDFs (Arkema, T4, and Swan Island Lagoon)
  - CADs (Ross Island, Columbia River, and Swan Island Lagoon)
  - Upland disposal (five upland landfills)
- The Portland Harbor ROD will identify which sediment may be disposed of where
  - Consider contaminant concentration and leachability
  - Consider hazardous waste characteristics
- Details regarding construction of on-site CDFs and CADs will be developed during remedial design
- On-site CDFs and CADs must comply with applicable performance standards

FS Alternatives Evaluation
9 Criteria

Superfund requires each cleanup alternative undergo an evaluation on the basis of nine criteria. The objective is to compare and contrast the alternatives so that decision makers may select a preferred alternative.

- **Threshold Criteria** – must be met for an alternative to be considered

1. Overall protection of human health and the environment
2. Compliance with applicable relevant and appropriate requirements (ARARs)

FS Alternatives Evaluation
9 Criteria

- **Balancing Criteria** – Once an alternative has passed the first threshold it is balanced against the others that also passed using the following balancing criteria:

3. Long-term effectiveness
4. Reduction of mobility, toxicity, and volume through treatment
5. Short-term effectiveness
6. Implementability
7. Cost

FS Alternatives Evaluation
9 Criteria

- **Modifying Criteria** – After balancing the alternatives against each other an alternative that best satisfies each of the balancing criteria is considered for proposed selection based upon the following:

  8. State acceptance
  9. Community acceptance

CDF Performance Standards

- Contain the volume, level, and characteristics of contaminated sediment
- Minimize physical intrusion into waters of the United States
- Minimize water flow into and out of the CDF
- Confine hazardous substances such that the CDF does not contribute any long-term discharge and/or release of contaminants above water quality criteria
- Limit contaminant concentrations in groundwater (including berm pore water) exiting the CDF to levels below EPA's national recommended chronic water quality criteria

CDF Performance Standards

- Design the CDF in a manner that is consistent with the Remedial Action Objectives and Management Goals for the Portland Harbor site
- Design CDF berms to:
  - Provide a static safety factor of 1.5 or greater and a seismic safety factor of 1.1 or greater
  - Be resistant to erosive forces by the largest of 100-year flood flow, 100-year waves, vessel-induced waves and prop wash from typical passing vessels
  - Have an appropriate gradation to allow transport of groundwater while retaining (filtering) sediment during filling and after closure
- Ensure that the CDF will not measurably increase the 100-year flooding stage or decrease flood storage of the Willamette River.

CDF Performance Standards

- Maintain saturated or unsaturated conditions (as appropriate) within the confined contaminated sediments
- Minimize releases of 303(d) listed contaminants to the extent practicable
- Meet all performance standards, Applicable or Relevant and Appropriate Requirements (ARARs), and the final Portland Harbor ROD requirements in perpetuity
- Minimize, to the extent practicable, water quality exceedances within the construction zone and achieve compliance with water quality criteria/standards at and beyond the specified point of compliance

CDF Performance Standards

- Minimize impacts to fisheries and wildlife by removing fish to the extent practicable from the CDF area before and during berm construction
- The CDF berm will be constructed from clean granular material free of roots, inappropriate organic material, contaminants, and all other deleterious and objectionable material
- Accept only sediments meeting final sediment acceptance criteria subject to EPA approval
- Avoid or minimize short-term overflows
- During filling of the CDF, groundwater (berm pore water) exiting the CDF must meet acute water quality criteria

CDF Performance Standards

- Physically close any hydraulic connection between river and the CDF (except through groundwater) during construction except during periods of actual approved overflow
- Manage the CDF in a manner that minimizes impacts to fisheries and wildlife
- Cap contaminated sediments with acceptable clean soils/sediment
- Stormwater discharges or infiltration of stormwater into the CDF is not allowed
- Monitor CDF(s) in perpetuity, or until reduced monitoring is approved by EPA

CDF Performance Standards

- Provide appropriate financial assurance for project development, closure, long-term monitoring, mitigation as needed, and contingency actions
- Implement appropriate institutional controls to:
  - Prevent disturbance of the sediment
  - Prevent stormwater infiltration into the CDF or the CDF buffer zone
  - Prevent installation of groundwater extraction wells for any purpose within the CDF or the CDF buffer zone
  - Restrict development on the CDF

CDF Remedial Design Considerations

- Berm and cap construction and materials
- Liner materials and placement
- Filling sequence and methodology
- Environmental controls during filling
- Seismic stability and resistance to large scale floods
- Vessel induced waves and prop wash
- Long-term monitoring requirements
- Stormwater management
- Habitat mitigation
- Institutional controls

Community Involvement and Remedy Selection

- National Contingency Plan (NCP) identifies community acceptance as a modifying criteria
- Involving the community early and often is one of the 11 principles for managing contaminated sediment sites
- Viable disposal options will be identified in the Proposed Plan which will be issued for public review and comment
- Additional input from EPA?

EPA Contact

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- Additional Information

http://www.epa.gov/region10/portlandharbor